UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/060,825	04/16/1998	ROBERT BRENNAN	680148	1023

7590 10/02/2003	EXAMINER
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ART UNIT	PAPER NUMBER
2644	

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DATE MAILED: 10/02/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2003* .

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-20 and 31-33* is/are allowed.

6)☒ Claim(s) *21-24 and 27-29* is/are rejected.

7)☒ Claim(s) *30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4)☐ Interview Summary (PTO-413) Paper No(s). _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: ____ .

DETAILED ACTION

1.   A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on

September 16, 2003 has been entered.

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3.   **Claims 21-22, and 27-29** are rejected under 35 U.S.C. 102(b) as being

anticipated by Lindemann et al. (5,479,522, hereinafter, "Lindemann").

Regarding **claim 21**, Lindemann teaches an apparatus (see Fig. 11 and respective

portions of the specification), for reducing noise in an input signal (LEFT IN col.12, lines

62-67), the apparatus including an input for receiving the input signal, the apparatus

comprising:

(a) a compression circuit (266) for receiving a compression control signal

and generating an amplification control signal (for multiplier 268 col.12, lines 62-67) in

response;

(b) an amplification unit (multiplier 268) for receiving the input signal and the

amplification control signal and generating an output signal (LEFT OUT) with

compression and reduced noise (col. 12, lines 12-61); and,

(c) an auxiliary noise reduction unit (260, 262, 264) connected to the input

for generating an auxiliary noise reduced signal (to compression gain 266), the

compression control signal being the auxiliary noise reduced signal (col. 12, lines 12-

61).

Regarding **claim 27**, Lindemann et al. further teaches an apparatus as claimed in

claim 21, wherein the apparatus further comprises a main noise reduction unit (265, left

gain vectors) connected to the input (LEFT IN) for generating a noise reduced signal

and supplying the noise reduced signal to the amplification unit (268) in place of the

input signal (col. 12, lines 55-61).

Regarding **claim 28**, Lindemann et al. further teaches the main noise reduction

unit (265) and the auxiliary noise reduction unit (260, 262, 264) comprise a single unit

(see Fig. 11, col. 12, lines 12-61).

Regarding **claim 29**, Lindemann et al. teaches an apparatus as claimed in claim

27. Lindemann et al. does not explicitly disclose wherein the auxiliary noise reduction

unit is different from the main noise reduction unit. However, it is obvious for the

separating the auxiliary noise reduction unit from the main noise reduction unit.

Therefore, it would have been obvious to one of the ordinary skill in the art at the time

the invention was made to incorporate such teaching for purpose of being easy to

repair.

Regarding **claim 22**, Lindemann et al. further teaches an apparatus as claimed in

claim 27, wherein the input signal contains speech and the main noise reduction unit

(see Fig. 1, 4, 7, 11, and respective portions of the specification) comprises:

(1) a detector (microphone 16) connected to said input and providing a

detection signal indicative of the presence of speech (col. 3, lines 51-58);

(2) magnitude means (sum MAGSQ 154) for determining the magnitude

spectrum of the input signal ($|X(f)|$), with both the detector and the magnitude means

being connected to the input of the apparatus (col. 8, lines 26-57);

(3) spectral estimate means (beam spectrum subtract gain 158, Fig. 4) for

generating a noise magnitude spectral estimate $|N^{\wedge}(f)|$ and being connected to the

detector and to the input of the apparatus (col. 9, lines 50-65);

(4) a noise filter calculation unit (160, 162, Fig. 7) connected to the

spectral estimate means and the magnitude means, for receiving the noise magnitude

spectral estimate $|N^{\wedge}(f)|$ and magnitude spectrum of the input signal ($|X(f)|$) and

calculating an attenuation function ($H(f)$; col. 9, line 50 – col. 10, line 20; col. 12, lines

35-54); and,

(5) a multiplication unit (202, Fig. 4) coupled to the noise filter calculation

unit and the input signal for producing the noise reduced signal (col. 11, lines 22-29).

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5.   **Claims 23-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over

Lindemann et al. (5,479,522, hereinafter, "Lindemann") in view of Händel (PCT WO

96/24128).

Regarding **claim 23,** Lindemann et al. teaches an apparatus as claimed in claim

22.   Lindemann et al. further teaches a frequency transform means (FFT, see Fig. 1B,

11, and respective portions of the specification) connected between said input (LEFT

IN) and both of the magnitude means (sum MAGSQ 154) and the spectral estimate

means (beam spectrum subtract gain 158, Fig. 4; col. 9, lines 50-65) for transforming

the signal into the frequency domain to provide a transformed signal (X(f)) wherein the

magnitude means determines the magnitude spectrum (IX(f)I) from the transformed

signal (X(f); col. 8, lines 26-57), and wherein the spectral estimate means determines

the noise spectral estimate (| N | (f)), the apparatus further including inverse frequency

transform means (FFT $^{-1}$) for receiving a transformed noise reduced signal from the

multiplication unit, the inverse frequency transform means providing the noise reduced

signal (col. 12, line 35 – col. 13, line 10).

However, Lindemann et al. does not explicitly disclose wherein the spectral

estimate means determines the noise spectral estimate (| N | (f)) from the transformed

signal (X(f)) in the absence of speech.

Händel teaches reducing noise (see page 2, lines 10-12) in an input, the input

signal containing speech (see page 2, lines 3-6), and having a signal to noise ratio

(SNR; see page 16, lines 5-6; Fig. 1 and Fig. 7); in the absence of speech (see page 5,

lines 13-15), determining a noise magnitude spectral estimate (| N^(f) |, 140, see Fig. 7).

Therefore, it would have been obvious to one of ordinary skill in the art, at the

time the invention was made to incorporate Händel teaching with Lindemann et al. in

order to provide a better noise reduction without sacrificing audible quality, as

suggested by Händel in page 2, lines 12-13.

Regarding **claim 24**, Händel further discloses a spectrum subtraction wherein

(see page 7, Table 2, line 8) the attenuation function means (24, Fig. 1) calculates the

auxiliary signal as an attenuation function because the method attenuation function with

an oversubtraction factor and an attenuation rule gives a better noise reduction without

sacrificing audible quality (see page 2, lines 12-13). Händel further discloses the

equation:

$$H(f) = \{ (\, | \, X(f) \, |^2 - \beta \, | \, N^{\check{}}(f) \, |^2 \,) / \, | \, X(f) \, |^2) \}^{\alpha}$$

Where: $H(f) = \hat{H}_{\delta PS}(w)$, attenuation function (see page 7, line 2-3)

$X(f) = \Phi^{\wedge}_x(w)$, magnitude spectrum of the input audio signal

(see page 3, line 26-27)

$N^{\check{}}(f) = \Phi^{\wedge}_v(w)$, noise magnitude spectral estimate

(see page 4, line 3-4)

β $= \delta$, oversubtraction factor (see page 26, lines 6-7)

α $= \frac{1}{2}$, an attenuation rule

wherein α and β are selected to give a desired attenuation function.

Allowable Subject Matter

6.   **Claims 1-20, 25-26, 31-33** are allowed.

7.   **Claim 30** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding **claims 1, 30, 31, 32, and 33,** the cited prior art provided numerous examples of different noise reduction methods but failed to disclose or fairly suggest the specific functional limitation *"wherein there is no substantial modification to the input signal for very low and for very high signal to noise ratios "* as specify in claim.

Claims 2-20, and 25-26 are allowable by virtue of their dependency on claim 1.

Response to Arguments

8.   Applicant's arguments with respect to claims 1, 30, 31, 32, and 33 are persuasive.

Applicant's arguments with respect to claims 21-24, and 27-29 have been considered but are moot in view of the new grounds of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Con P. Tran, whose telephone number is (703) 305-2341. The examiner can normally be reached on M - F (8:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W. Isen can be reached on (703) 305-4386. The fax phone numbers for the organization where this application or proceeding is assigned are (703)
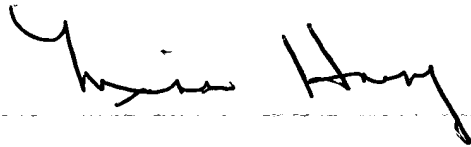
872-9314 for regular communications and (703) 872-9314 for After Final

communications.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the Customer Service Office at telephone number

(703) 306-0377.

cpt *CPJ*
October 1, 2003

MINSUN OH HARVEY
PY EXAMINER